

## CLAIMS

We claim:

- [c1]           1.     A method of automatic white balancing comprising:
- (a)     determining an illuminant source by identifying a predefined white area of a color space diagram having a highest number of pixels;
- (b)     calculating an average R value, an average G value , and an average Blue value of said pixels; and
- (c)     determining a gain adjustment based on said average R value, said average G value, and said average B value.
- [c2]           2.     The method of Claim 1, wherein said pixels are white pixels.
- [c3]           3.     The method of Claim 2, further including the step of calculating a G/R ratio and a G/B ratio of said pixels.
- [c4]           4.     The method of Claim 3, wherein said G/R ratio and said G/B ratio of said pixels are plotted on said color space diagram.
- [c5]           5.     The method of Claim 4, wherein said R value, said G value, and said B value are accumulated for said pixels.

[c6] 6. A method of identifying an illuminant source of a captured image for automatic white balance comprising:

(a) calculating a G/R ratio and a G/B ratio for a pixel of said captured image;

(b) plotting said G/R ratio and said G/B ratio in a color space diagram; and

(c) determining a predefined white area of said color space diagram having a highest number of said pixels, which is indicative of said illuminant source of said captured image.

[c7] 7. The method of Claim 7, wherein said pixels are white pixels.

[c8] 8. A method of determining a gain adjustment for automatic white balance comprising:

(a) calculating an average R value, an average G value, and an average Blue value of a pixel of a captured image; and

(b) determining a gain adjustment based on said average R value, said average G value, and said average B value.

[c9] 9. The method of Claim 8, wherein said pixel is a plurality of selected white pixels of a predefined white area.

[c10] 10. A method of automatic white balancing comprising:

- (a) calculating a G/R ratio and a G/B ratio for a pixel;
- (b) plotting said G/R ratio and said G/B ratio in a color space diagram;
- (c) accumulating a R value, a G value, and a Blue value for each said pixel that has said G/R ratio and said G/B ratio inside a predefined white area of said color space diagram;
- (d) determining an illuminant source by identifying said predefined white area containing a highest number of said pixels;
- (e) calculating said R value average, said G value average, and said B value average; and
- (f) determining a gain adjustment based on said R value average, said G value average, and said B value average.

[c11] 11. A method of predefining a white area in a color space diagram for automatic white balance comprising:

- (a) calculating a G/R ratio and a G/B ratio for a white color block;
- (b) repeating step (a) for each illuminant type; and
- (c) determining a white area for each said illuminant type based on said G/R ratio and said G/B ratio for said white color block.

[c12] 12. The method of Claim 11, further including a plurality of color blocks of different colors.

[c13] 13. The method of Claim 12, wherein said color blocks including a plurality of gray color blocks of different shades.

[c14] 14. The method of Claim 13, wherein steps (a) and (b) are repeated for each of said gray color block.

[c15] 15. The method of Claim 14, wherein said white area is defined by said G/R ratio and said G/B ratio of said white color block and said gray color blocks.

[c16] 16. A method of predefining a white area in a color space diagram for automatic white balancing comprising:

(a) using a color chart having a plurality of color blocks including a white, a gray 1, a gray 2, a gray 3, a gray 4, and a black color block under a target illuminant source;

(b) calculating a G/R ratio and a G/B ratio for each said color block;

(c) plotting said G/R ratio and said G/B ratio of each said color block on said color space diagram;

(d) defining said white area on said color space diagram for said target illuminant source based upon said G/R ratio and said G/B ratio for said white, said gray 1, said gray 2, said gray 3, and said gray 4 color blocks; and

(e) repeating steps (a) through (c) for each said target illuminant source.

[c17] 17. An apparatus for automatic white balance comprising:

(a) an area selection module for determining a predefined white area of a color space diagram for a pixel;

(b) an accumulate for averaging module for storing a R value, a G value, and a Blue value of said pixel; and

(c) a decide gain value module for determining a gain adjustment.

[c18] 18. The method of Claim 17, wherein said area selection module calculates a G/R ratio and a G/B ratio of said pixel.

[c19] 19. The method of Claim 18, wherein said area selection module analyzes said predefined white area to identify said predefined white area having a highest number of said pixel, which is indicative of said illuminant source.

[c20] 20. The method of Claim 19, wherein said decide gain value module calculates an average R value, an average G value, and an average B value of said pixel for said gain adjustment for a color channel.